

Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) ~~An optical~~ A waveguide comprising:  
a dielectric core region extending along a waveguide axis; and  
a dielectric confinement region surrounding the core about the waveguide axis, the  
confinement region comprising ~~a photonic crystal structure having a photonic band gap~~  
alternating layers of at least two different dielectric materials surrounding the core about the  
waveguide axis, wherein during operation the confinement region guides EM radiation in at least  
a first range of frequencies to propagate along the waveguide axis in the core,  
wherein the core has an average refractive index smaller than about 1.3 for a frequency in  
the first range of frequencies, and  
wherein the core has a diameter in a range between about  $4\lambda$  and  $80\lambda$ , wherein  $\lambda$  is a  
wavelength corresponding to a central frequency in the first frequency range, ~~and~~  
~~wherein the dielectric confinement region extends transversely from the core for at least a~~  
~~distance of about  $6\lambda$ .~~

Claims 2 – 62 are Cancelled.

63. (Currently Amended) ~~An optical~~ A waveguide comprising:  
a dielectric core region extending along a waveguide axis; and  
a dielectric confinement region surrounding the core about the waveguide axis, the  
confinement region comprising alternating layers of at least two different dielectric materials

surrounding the core about the waveguide axis and guiding EM radiation in at least a first range of frequencies to propagate along the waveguide axis in the core,

wherein the core has an average refractive index smaller than about 1.3 for a frequency in the first range of frequencies, and

wherein the core has a ~~diameter~~ diameter in a range between about 5 microns and 170 microns.

64. (Currently Amended) The waveguide of claim 63, wherein the core has a diameter in a range between about 7 microns and ~~400~~ 170 microns.

65. (Original) The waveguide of claim 63, wherein the core has a diameter in a range between about 10 microns and ~~400~~ 170 microns.

Claims 66 – 72 are Cancelled.

73. (New) The waveguide of claim 1, wherein the waveguide supports a mode in which at least 99% of the average energy of the propagating EM radiation is in the core for a frequency in the first range of frequencies.

74. (New) The waveguide of claim 1, wherein the ratio of the bandwidth of the first range of frequencies and the central frequency and is at least about 10%.

75. (New) The waveguide of claim 1, wherein the confinement region guides at least one mode to propagate along the waveguide axis with radiative losses less than 1.0 dB/km for a frequency in the first range of frequencies.

76. (New) The waveguide of claim 1, wherein the confinement region guides at least one mode to propagate along the waveguide axis with radiative losses less than 0.1 dB/km for a frequency in the first range of frequencies.

77. (New) The waveguide of claim 1, wherein the core comprises a gas.

78. (New) The waveguide of claim 1, wherein the first range of frequencies corresponds to wavelengths in the range of about 1.2 microns to 1.7 microns.

79. (New) The waveguide of claim 1, wherein the first range of frequencies corresponds to wavelengths in the range of about 0.7 microns to 0.9 microns.

80. (New) The waveguide of claim 1, wherein the ratio of the refractive index of the two different dielectric materials in the dielectric confinement region is greater than 1.5.

81. (New) The waveguide of claim 1, wherein the dielectric confinement region is sufficient to cause EM radiation that is incident on the confinement region from the core in the first frequency range and with any polarization to have a reflectivity for a planar geometry that is greater than 95% for angles of incidence ranging from 0° to at least 80°.

82. (New) The waveguide of claim 1, wherein a lower-index one of the different dielectric materials comprises a polymer or a glass.

83. (New) The waveguide of claim 1, wherein a higher-index one of the dielectric material comprises germanium, tellurium, or a chalcogenide glass.

84. (New) The waveguide of claim 1, wherein the diameter of the core is in the range of about  $8\lambda$  and  $80\lambda$ .

85. (New) The waveguide of claim 1, wherein the diameter of the core is in the range of about  $4\lambda$  and  $60\lambda$ .

86. (New) The waveguide of claim 1, wherein the diameter of the core is in the range of about  $5\lambda$  and  $60\lambda$ .

87. (New) The waveguide of claim 1, wherein the diameter of the core is in the range of about  $6\lambda$  and  $40\lambda$ .

88. (New) The waveguide of claim 1, wherein the diameter of the core is in the range of about  $8\lambda$  and  $40\lambda$ .

89. (New) A waveguide comprising:  
a dielectric core region extending along a waveguide axis; and  
a dielectric confinement region surrounding the core about the waveguide axis, the confinement region comprising alternating layers of at least two different dielectric materials surrounding the core about the waveguide axis,  
wherein during operation the confinement region guides EM radiation in at least a first range of frequencies to propagate along the waveguide axis in the core to have radiative losses less than 1.0 dB/km for a frequency in the first range of frequencies,  
wherein the core comprises a gas and has an average refractive index smaller than about 1.3 for a frequency in the first range of frequencies,  
wherein the core has a diameter in a range between about  $4\lambda$  and  $80\lambda$ , wherein  $\lambda$  is a wavelength corresponding to a central frequency in the first frequency range, and  
wherein a ratio of a refractive index of a high-index one of the two dielectric materials in the dielectric confinement region for the central frequency to that of a low-index one of the two dielectric materials is greater than 1.5.

90. (New) The waveguide of claim 65, wherein  
during operation the confinement region guides EM radiation in at least a first range of frequencies to propagate along the waveguide axis in the core to have radiative losses less than 1.0 dB/km for a frequency in the first range of frequencies,  
the core comprises a gas, and  
a ratio of a refractive index of a high-index one of the two dielectric materials in the dielectric confinement region for a central frequency in the first frequency range to that of a low-index one of the two dielectric materials is greater than 1.5.